CHIRPED PULSE MILLIMETER WAVE SPECTROSCOPY OF COMPLEX MOLECULES

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Our chirped pulse millimeter wave spectrometer for complex molecules of astrophysical interest is operational between 75 and 110 GHz, which is coincident with the Atacama Large Millimeter/Submillimeter Array (ALMA) Band 3. High sensitivity and stability is a focus of our research to be able to measure isotopic species of molecules in natural abundance on the one hand and to observe fragments of molecules, which are produced with a high voltage DC discharge in combination with a supersonic jet on the other hand. For the latter application, first tests were performed with methyl cyanide (CH_3CN). We observed HCN as well as HNC discharge products. As the detector side of our instrument coincides in many aspects with our emission spectrometers [1,2] a comparison of chirped pulse measurements and emission spectroscopy will be discussed briefly. Additionally, we show and discuss current improvements and developments of our chirped pulse instrument. Other candidate molecules are ions or radicals created by the discharge and other means with the aim to record their fingerprint-like rotational spectra.

References:

[1] N. Wehres, B. Heyne, F. Lewen, M. Hermanns, B. Schmidt, C. Endres, U. U. Graf, D. R. Higgins, and S. Schlemmer, Proceedings of the International Astronomical Union, 13(S332), 332-345. DOI:10.1017/S1743921317007803

[2] N. Wehres, J. Maßen, K. Borisov, B. Schmidt, F. Lewen, U. U. Graf, C. E. Honingh, D. R. Higgins, and S. Schlemmer, Phys. Chem. Chem. Phys. 20, 5530–5544 (2018), DOI:10.1039/C7CP06394F